



DEVELOPMENT STANDARDS Code

PUBLIC FACILITIES STANDARDS

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Section 8-8-1 Purpose and General Regulations

- A. Purpose. It is the purpose of this article to define the responsibility of the developer or subdivider and the City in the planning, construction, and financing of public improvements, to establish the minimum acceptable standards and required public improvements for developments or subdivisions and to establish procedures for review and approval of engineering plans.
- B. Responsibility for Improvement
 - 1. It is the responsibility of the developer or subdivider to finance the planning, design, and construction of all streets and alleys, curbs and gutters, sidewalks, crosswalks, street name signs, drainage facilities, sewage disposal facilities, monuments, street lights, fire hydrants, water facilities, and all other public and semi-public improvements required by the Council, this article, or the Arizona Revised Statutes to standards established herein.
- C. Engineering Plans Required
 - 1. The developer or subdivider shall be responsible for having a registered engineer prepare a complete set of engineering plans, satisfactory to the City Engineer, for construction of required improvements. Such plans shall be based on the approved preliminary plat or site plan and be prepared in conjunction with the final plat or site plan. Engineering plans shall have been stamped "Approved for Construction" by the City Engineer prior to issuance of any necessary building permits, right-of-way permits, or the like.

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2. Plans submitted in accordance with the provisions of Sections 8-18 or 8-19 shall be reviewed and approved by the City Engineer and the Building Inspector. In addition, a set of water improvement plans shall be supplied to the Department of Public Works which, in turn, will review the plans and make its written recommendations to the City Engineer and the Building Inspector.

3. Three (3) sets of final, approved improvement plans shall be supplied to the City Engineer prior to commencing construction.

D. Engineering Plans Scale. Plans shall be drawn at an appropriate scale. Drawings shall be oriented so that north will be at the top of the page. However, when the preceding requirements prove to be impractical, then north shall be oriented to the left side of the page.

1. Profiles shall show existing and proposed elevations along center lines of all streets as well as the edge of existing paving and all gutter lines, if any. When a proposed street intersects an existing street or streets, the elevation along the center line of the existing street or streets within two hundred (200) feet of the intersection shall be shown. Existing grades shall be shown on twenty-five (25) foot intervals and new grades on fifty (50) foot intervals. Approximate radii of all curves, lengths of tangents, and central angles on all streets shall be shown.
2. Plans and profile sheets shall show the locations and typical cross-section of street pavements including curbs and gutters, sidewalks, drainage easements, rights-of-way, manholes, and catch inlets; the locations of street trees, the location of replacement trees for those to be removed in the development process; the location, size, direction of flow, and invert elevations of existing and proposed sanitary sewers, storm water system, and fire hydrants.
3. Streets and storm water systems shall be shown on separate set of drawings.
4. Sanitary sewage and water systems shall be shown on the same set of drawings.
5. Location, size, elevation, and other appropriate description of any existing facilities or utilities shall be shown on the drawings. In addition, all elevations shall be referred to the City's local datum plane.

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6. All specifications and references required by the City's construction standards (Ordinance 18P) and specifications shall be shown on the construction drawings.
 7. Title, name, address, stamp, registered seal, and signatures of the engineer and surveyor, and date, including revision dates, shall be shown on the drawings.
- E. Improvement Standards. All required improvements shall be designed and constructed in accordance with the latest revision of the Uniform Standard Specifications for Public Works Construction and the Uniform Standard Details for Public Works Construction, City Ordinance 18P, and other standards as adopted by the City Council.
- F. Inspection and Testing of Improvements.
1. All improvements in the public right-of-way shall be constructed subject to the inspection of the Building Inspector and the approval of the City Engineer. Construction shall not be commenced until a permit has been issued for such construction and if work has been discontinued for any reason, it shall not be resumed until after notifying the Building Inspector in advance.
 2. The developer shall be responsible for having a person who is authorized under Article 32 of the Arizona Revised Statutes to perform materials testing conduct the testing of all materials used in the construction of public improvements.
 3. The results of all tests shall be provided to the City Engineer prior to the final inspection and during the construction phase of the project.
- G. Inspections. Upon due notice from the developer of presumptive completion of all improvements as called for on the approved improvement plans and required under the provisions of this Code, the City Engineer and Building Inspector shall make an inspection. If all construction is found to be completed to their satisfaction, then that inspection shall constitute the final inspection and the City Engineer and Building Inspector shall recommend final acceptance of the public improvements for maintenance to the City Council upon receipt of the following items in writing or as required.
- (1) A fee of one percent of the total construction costs shall be assessed and collected by the Building Inspector from the developer after final inspection/acceptance.

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- (2) Final as Built Plans. The developer shall submit final as built plans drawn as built in india ink, or a reproducible copy thereof, showing all street, drainage, and sewer improvements constructed, and copies of the final plans showing all electrical, lighting, gas, telephone, cable television and water improvements constructed within public right-of-way or public easements for inclusion in the City's permanent files. Final plans shall show the approved design conditions and reflect any field changes approved by the City Engineer, and developer's engineer shall certify that the final plans represent as nearly as possible the actual field conditions as constructed. Reproducible copies shall be defined as a copy prepared using an archival photographic image process conforming to standards established by the American National Standards Institute on a polyester material four thousandths (.004) of an inch thick with a matte finish.
- (3) Affidavit Regarding Settlement of Claims. The developer shall certify that all bills for labor and materials incorporated in the work have been paid and agree to indemnify and save harmless the City against any and all liens, claims of liens, suits, actions, damages, charges, and expenses whatsoever, which the developer may suffer arising out of the failure of the developer to pay for all labor performed and materials furnished in the construction of the required improvements.
- (4) Guarantee. The developer and contractor shall guarantee all work against defective workmanship or materials for a period of one (1) year from the date of its final acceptance by the Mayor and City Council. Upon final acceptance of the public improvements by the Mayor and City Council, the City Engineer will notify the developer in writing of this acceptance as of the date of approval by the Council.
- (5) Improvement Guarantee.
 - (a) Before issuing or renewing a development permit when the applicant has an obligation to develop public improvements, the obligation shall either be fulfilled prior to the issuance of the development permit or the applicant shall be required to file with the City an acknowledgement of the obligations as either a subdivision or development agreement. The acknowledgement shall contain the time within which it is to be met and

provide security by either: (1) posting of a performance bond by a qualified surety; (2) establishing a cash trust, said funds to be deposited with the City to the credit of the developer; (3) depositing with the City a certificate of deposit issued by a banking institution authorized to issue same; or (4) filing with the City an executed contract of guarantee between the City and a trust company, banking institution, or other financial institution authorized to enter into such contracts; or in the case of subdivision only, (5) filing with the City a third party trust agreement executed by a trust company, banking institution or other financial institution authorized to enter into such contracts.. The amount of said security is to be based upon the cost estimate prepared by registered professional civil engineer in an amount to cover and complete installation of the improvements and requires approval by the City Engineer.

- (b) Where applicable, a concurrent agreement may be executed between the City and the developer providing for incremental improvements in planned area developments; provided, however, that each approved increment shall conform to the security requirements hereinabove specified. The City may require of the developer such further assurance of the completion of improvements as it may deem necessary to the interest of the public.
- (c) The security shall be conditioned upon the carrying out the obligation and fulfilling the other requirements of this Code that bear on the approval of the development. The security shall be forfeited to the City if the developer does not fulfill the requirements. The security shall remain in the custody of the City until the obligation is completed or the security is forfeited, or shall be placed in an escrow account subject to City control. Upon acceptance of the improvements by the City Council, the security will be released to the developer.

H. Noncompliance with Provisions Under Obligation.

- 1. If the City Engineer finds that a developer is not complying with the provisions under his obligation or the requirements of this code regarding the obligation, the City Engineer shall, in written notice to the developer and the surety, specify the details of non-compliance. Unless the City Council allows more time for the compliance because of circumstances beyond the control of the developer, within thirty (30) days after receiving the notice, the developer or the surety shall commence the compliance and proceed diligently to complete fulfillment of the obligation.

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2. If the developer or the surety does not commence the compliance within the thirty (30) days or the additional time allowed by the City Council, or has so commenced but fails to complete the compliance, the City may take the following action:
 - a. Enter upon the site of the development and carry out the obligation in accordance with the provisions agreed upon under the acknowledgement.
 - b. Notify the developer and the surety of the failure to perform as required by this code.
 - c. Demand payment from the developer for the unfulfilled obligation.
 - d. If the security for the obligation is a bond, notify the surety that has furnished the bond that reimbursement for the expense for fulfillment of the obligation is due and payable to the City or, if the security is a deposit of cash or other assets, appropriate as much of the deposit as it deems necessary to recoup the expense.
 - e. If a third party trust is used, take all necessary actions required by the agreement.
3. If a bond or other security required by Section 8-8-1, H is not sufficient to compensate the City for expenses necessary to fulfill the obligation, the amount due to the City for the obligation is a lien in favor of the City and upon the entire contiguous real property of the owner of the land subject to the obligation.
4. A lien shall be attached upon the filing with the county recorded of the notice of the claim for the amount due for the fulfillment of the obligation. The notice shall demand the amount due, allege the insufficiency of the bond or other security to compensate the City fully for the expense of the fulfillment of the obligation, and allege the developer's failure to do the required obligation.
5. The lien may be foreclosed in the manner prescribed by law for foreclosing other liens on real property.

(I) Dedication and Improvement.

1. Requirement. No building or structure shall be erected or enlarged, and no building permit shall be issued therefor in the City, on any parcel of land which abuts any existing or proposed street or alley, if the prospective erection or enlargement of the said building or structure or use thereof will effect an increase of traffic in the street or alley right-of-way unless the one-half of any such abutting right-of-way which is located on the same side of the center of the street or alley as such parcel of land has been dedicated and improved for the full width of the parcel where it abuts so as to meet the standards for each right-of-way as provided in Section 8-8-2, or such dedication and improvement has been assured to the satisfaction of the City Engineer. As used in this section, the center of the street or alley shall mean the centers of those existing and proposed rights-of-way as would ordinarily be required and developed under requirements of this Code as approved by the City Engineer.
 - a. The maximum area of land required to be so dedicated shall not exceed twenty-five percent (25%) of the area of any such parcel which was of record on October 26, 1972, in the Santa Cruz County Recorder's Office. In no event shall such dedication reduce the parcel below a width or an area which is the minimum permitted by this Code.
 - b. No additional improvements shall be required on such a parcel where complete roadway, paving, curb, gutter, sidewalk and storm drain improvements exist within the present dedication contiguous thereto and which were constructed according to the City or County standards applicable at the time of construction for public improvements.
 - c. The maximum improvements required, shall be:
 1. Twenty (20) feet of asphalt paving.
 2. One curb and gutter on the perimeter and adjacent to the development.
 3. Five (5) feet of sidewalk in width on the perimeter and adjacent to the development.
 4. Twenty (20) feet of alley paving.

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5. One vertical curb along a median island or traffic separator the length of the perimeter of the development.
6. Such storm drains, irrigation, flood control and other public improvements as would normally be required under this Code.

Section 8-8-2 Streets

- A. General Provisions. No development permit or subdivision approval shall be issued unless the development has frontage or approved public access to a public street. Abutting streets shall be dedicated and improved to the Design Standards of Section 8-8-3. No development will be permitted where it will cause traffic generation beyond the streets' current carrying capacity including pavement width and signalization. No development permits will be granted where such development will create dangerous or hazardous traffic conditions.
- B. Street Orientation for Energy Conservation. To plan for energy conserving orientation of future urban development, new streets should be designed in an east-west orientation. When topographic conditions or existing street layout make street design for good solar orientation difficult or undesirable, lots shall be laid out so that the units can be oriented to the south to the greatest extent possible.
- C. Street Arrangement. All streets shall be properly related to special traffic generators, such as industries, business districts, schools and shopping centers and to the pattern of existing and proposed land uses.
- D. Traffic Circulation Plan Conformance. Whenever the development embraces any part of a street designated in the adopted Traffic Circulation Plan or in any adopted neighborhood or specific plan, such street shall be developed in conformity therewith; provided, however, that the developer may request and the City Council may approve minor deviations in alignment where it is found to be impractical to conform to the exact alignment shown on the Traffic Circulation Plan or other plan because of adverse topography, drainage problems, existing development, or traffic safety. Such minor deviations may be made without adversely affecting the public purpose to be served by the street; provided however, that the distance between an Arterial or Collector and a parallel Collector does not exceed fifteen hundred feet (1,500').

- E. Street Continuations. Street layouts shall provide for the continuation of existing and proposed Arterial and Collector Streets into adjacent areas and such other streets as the City Engineer may designate. Streets which the City Engineer should designate, include, but are not limited to, Collector and Local Streets required to provide future connection with adjoining unplatted lands. In general, these extensions should not be further apart than the fifteen hundred foot (1,500') maximum permitted block length.
- F. Maximum Block Length. The maximum block length shall be fifteen hundred (1,500) feet measured along the centerline of the street and between intersecting street centerlines.
- G. Right-of-Way Requirements. When a residential development abuts the right-of-way of a primary arterial street or abuts a commercial or industrial land use, the City Engineer may require location of a street approximately parallel to such right-of-way or use at a distance suitable for appropriate use of the intervening land, such distance being determined with due regard for approachways, drainage, bridges, or future grade separations.
- H. Accesswalks. Accesswalks are not considered a satisfactory substitute for a directional street layout and shall be avoided; however, where essential for circulation and access to schools, playgrounds, and other community facilities, accesswalks eight (8) feet wide may be required by the City Engineer.
- I. Measurements. Unless otherwise noted, all width measurements are to property lines and all length measurements are along the centerline of the right-of-way and to the centerline of intersection streets.
- J. Intersection Criteria.
1. Streets intersecting an Arterial or Collector Street shall do so at a ninety degree (90°) angle. Local streets shall typically intersect at right angles but in no case less than seventy-five degrees (75°).
 2. Local streets intersecting a Collector street or Arterial street shall have a tangent section of centerline at least one hundred fifty (150) feet in length measured from the right-of-way line of the Major street, except that no such tangent is required when the local street curve has a centerline radius greater than six hundred (600) feet.

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3. Street jogs with centerline offsets less than one hundred twenty-five (125) feet shall be avoided except where waived by the City Engineer.
4. Street intersections with more than four (4) legs and Y-type intersections with legs meeting in acute angles shall be prohibited.

K. Intersection Design and Construction

1. Intersections shall be designed and constructed in accordance with the improvement standards for streets.
2. The approach to intersections shall have a relatively level area with a grade of not more than 2% for a distance of twenty-five feet measured from the nearest right-of-way line of the intersecting streets, except for unusual circumstances where City Engineer shall determine grade and distance in writing.

L. Street and Alley Construction. All streets and alleys shall be graded and paved with Asphaltic Concrete or Portland Cement Concrete to standards approved by the City. (See Article 3, Minimum Standards for Public Works Construction)

1. Where the minimum width (thirty-two (32) feet paved) access road is allowed, it shall be designed and constructed so that it can easily be widened to the full width street without reconstructing the center thirty-two (32) feet. Connection to existing and proposed streets shall be designed to safely accommodate traffic including any traffic control devices, and any drainage which may ultimately flow in the street.
2. The developer is required to develop one-half of the right-of-way of a perimeter street and to pave not less than twenty (20) feet of pavement width on each side of interior streets, except at intersections where the required street width is greater than fifty (50) feet.
3. The construction of a Principal or Major Arterial Street is the responsibility of the City. The developer is responsible for the construction of frontage roads or other public streets providing access to property adjacent to Principal and Major Arterials.

M. Curb-Gutter Design and Construction: All streets shall have Portland Cement Concrete curbs and gutters along the pavement edge constructed to city minimum standards for construction, except as noted below:

1. Combined six inch (6") high vertical curb and gutter is required on all streets except three and one-half inch (3 1/2) high rolled curb and gutter may be installed on streets in residential and industrial areas as long as the street drainage can be contained within the street sections.

N. Sidewalk Design and Construction:

1. Sidewalks shall be located behind the back-of-curb, provided that lighting standards, utility poles, traffic control devices, fire hydrants, mailboxes and similar obstructions can be located outside of the sidewalk area. In cases where such items cannot be located outside of the sidewalk area, the sidewalks may be located five (5) feet behind the back-of-curb. In all cases not otherwise governed by the provisions of the Manual of Uniform Traffic Control Devices, a minimum clearance of two (2) feet shall be maintained between the face-of-curb and any construction. See Article 3. In case of demonstrated necessity or existing unusual conditions the City Engineer may approve a reduction of minimum clearance to within one foot of the face-of-curb.

2. All streets shall have Portland Cement Concrete sidewalks behind the curb-gutter where curb-gutter is required. All accesswalks shown on the approved plan shall be constructed of Portland Cement Concrete or other appropriate material, and constructed to city minimum standards. Sidewalks shall be a minimum of four (4) inches thick and four (4) feet wide in residential districts and five (5) feet wide in commercial and industrial districts where required.

3. All returns shall have handicapped ramps at all corners of each intersection.

4. Sidewalks shall be required for all new development on lots of 12,000 square feet or smaller (residential and commercial/industrial subdivisions), otherwise development shall follow existing conditions, if sidewalks exist, then new development shall include sidewalks, if not, then sidewalks shall not be required.

O. Street Monument Construction: Permanent monuments consisting of a brass cap set in concrete, shall be installed to designate street center lines at all angle points and at points of curvature and at all street intersections. Concrete bases shall be no less than six inches in diameter and twenty-four inches deep with at least one (1) vertical steel

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reinforcing bar of minimum one-half inch (½") diameter placed directly beneath the brass cap and extending the full length of the concrete. After all improvements have been installed, the developer shall be responsible for having a registered land surveyor check the location of monuments and certify as to their accuracy prior to acceptance by the City of the public improvements for maintenance.

- P. Striping and Signage. All required painting, striping, and signage shall be installed by the developer in accordance with a plan approved by the City Engineer.

Section 8-8-3 Street Design Standards

A. General Provisions.

1. Type. PRINCIPAL ARTERIAL (RESERVED)

- a. Function. To expedite the movement of traffic to and from major trip generators. To collect from and distribute traffic to major and minor arterial and major collector streets.
- b. Design Volume. 30,000+ vehicles per day.
- c. Right-of-Way. 200 feet (The Council may approve reducing the required right-of-way by 25 feet along any frontage where a frontage street is not required or contemplated.)
- d. Constructed Street Width. Shall be determined by the City Engineer based on 10 year projected traffic volumes.
- e. Number of Moving Lanes. 6-8
- f. Design Speed. 55 m.p.h.
- g. Level of Service. B
- h. Access. Access shall be permitted only at intersection with Principal Major and Minor Arterial or Major Collector Streets.
 1. Residential Uses. No direct access.
 2. Commercial Uses. No direct access.
 3. Industrial Uses. No direct access.

- i. Parking. None
- j. Intersection Design. See Section 8-8-2.J.
- k. Horizontal Curves. 1,000 foot minimum radius.
- l. Length of Tangent.
Between Reverse Curves. 200 Feet.
- m. Nonvehicular Access Easements. See Section 8-8-7.
- n. Vertical Curves. Vertical curves shall be designed at all grade changes at one percent (1%) or greater and shall have a three hundred (300) foot minimum length but not less than fifty (50) feet for each one percent (1%) of algebraic difference in grade.
- o. Street Grades.
Maximum - 4%
Minimum - 0.5%
- p. Truck Restrictions. None
- q. Bicycle Lanes. Area to be provided on both sides of street, within the right-of-way, but separate.
- r. Sidewalks. Separate from street with minimum five (5) ft. planting strips where possible.
- s. Trees and Landscaping. See Article 1, Section 800

1. Type: MAJOR ARTERIAL (Example: Grand Avenue, Mariposa Road, Patagonia Highway)
 - A. Function: To collect and distribute traffic from principal/major/minor arterials, collectors, local streets.
 - B. Design Volume: 16,000 to 30,000 vehicles per day
 - C. Right-of-Way: 120 feet
 - D. Constructed Street Width: 16 feet for each lane, back of curb to back of curb, with 12 foot left turn lane at intersections of major and minor arterial streets.
 - E. Number of Moving Lanes: 4
 - F. Design Speed: 55 miles per hour
 - G. Access Control: One access every 1000 feet
 - a. Residential Uses: Access from all residential streets except major/minor local streets, cul-de-sacs less than 1000 feet long, lanes, ways, circles and access roads and ways less than 60 foot right-of-way.
 - b. Commercial Uses: All
 - c. Industrial Uses: All
 - H. Parking Aisles: None
 - I. Horizontal Curves: 300 foot minimum radius.
 - J. Length of Tangent Between Reverse Curves: 100 feet.
 - K. Non-vehicular Access Easements: See Section 8-8-7.
 - L. Vertical Curves: Vertical curves shall be designed at all grade changes of two percent (2%) or greater and shall have a two-hundred foot (200) minimum length, but not less than fifty (50) feet for each one percent (1%) of algebraic difference in grade, or, under unusual circumstances such as hillside development, geology, geography or terrain where impractical, the City Engineer shall determine proper grade and radii based on safety and other factors.
 - O. Street Grade: Maximum of 5%; Minimum of 0.5%
 - P. Truck Restrictions: Speed and weight according to Federal and State standards.
 - Q. Bicycle/Cart Lanes: None

R. Sidewalks: Separate from street with minimum of five (5) foot buffer where possible from behind curb to sidewalk. Ordinarily required where possible, but circumstances such as terrain, etc., shall be determined by City Engineer as to need for sidewalks, including traffic, location, use of road, relation to schools, hospitals, etc.

S. Trees and Landscaping: See Article 1, Section 800.

2. Type: MINOR ARTERIAL (Examples: Morley Avenue, Terrace St., Western Avenue)

A. Function: To collect and distribute traffic from all street types except lanes, ways, circles, etc., and access roads with less than 40 foot right-of-way.

B. Design Volume: 10,000 to 16,000 vehicles per day.

C. Right-of-Way: 120 feet.

D. Constructed Street Width: 16 feet each lane back of curb to back of curb, with 12 foot left turn lane at intersections of major and minor arterial streets.

E. Number of Moving Lanes: 2 or 4 lanes

F. Design Speed: 45 miles per hour

G. Access Control: One access point every 250 feet.

Residential Uses: Direct access

Commercial Uses: Direct access

Industrial Uses: Limited to 250 foot access requirement

H. Parking Aisle: None

I. Intersection Design: See Section 8-8-2-j

J. Horizontal Curves: 250 foot minimum radius

K. Length of Tangent Between Reverse Curves: 100 feet

L. Nonvehicular Access Easements: See Section 8-8-7

M. Vertical Curves: Same as for Major Arterial above.

N. Street Grade: Maximum of 5%, Minimum of 0.5%

O. Truck Restrictions: Same as for Major Arterial above

- P. Bicycle Lanes: 'None
- Q. Sidewalks: Same as for Major Arterial above
- R. Trees and Landscaping: See Article 1, Section 800
3. Type: MAJOR COLLECTOR (Example: Baffert Drive, Vista Del Cielo, Frank Reed Road)
- A. Function: Collector roads connect residential streets to the major and minor arterials, or provide access to residential corridors, major-minor local streets, crossing different zoning districts. Collector roads form barriers between neighborhoods and are designed for higher speeds and traffic volumes than residential streets.
- B. Design Volume: 1 to 10,000 vehicles per day
- C. Right-of-Way: 120 feet back of curb to back of curb for four-lane collectors; 100 feet back of curb to back of curb for 3 lane collector streets
- D. Constructed Street Width:
- 4 lanes = 16 feet each lane with 12 foot left turn lane at intersections with arterials and other major collectors
- 3 lanes = 16 feet each lane with 12 foot left turn center lane.
- 2 lanes = None
- E. Number of Moving Lanes: 3 or 4 lanes
- F. Design Speed: 45 miles per hour
- G. Access Control: Access point every 250 feet.
- Residential Uses: Direct Access
- Commercial Uses: Direct Access
- Industrial Uses: Access point every 250 feet.
- H. Parking: No parking aisle.
- I. Intersection Design: See Section 8-8-2-j
- J. Horizontal Curves: 250 foot minimum radius.
- K. Length of Tangent Between Reverse Curves: 100 feet

L. Nonvehicular Access Easements: See Section 8-8-2-j

M. Vertical Curves: Same as for arterials.

N. Street Grade: Maximum = 7%, Minimum = 0.5%

O. Truck Restrictions: Same as for arterials.

P. Bicycle Lanes: Allowable, 5 feet wide on one side.

Q. Sidewalks: Required. 5 feet from behind curb and separate from street. Circumstances such as terrain and other factors may determine that a sidewalk can only be installed on side of the street. Such circumstances shall be determined by City Engineer. Major collectors leading to schools or hospitals on the same street shall have sidewalks installed. 5 feet wide.

R. Trees and Landscaping: See Article 1, Section 800

4. Type: MINOR COLLECTOR, Residential/commercial
(Example: Country Club Drive, Target Range Road)

A. Function: Minor collector roads connect residential streets to arterials and major-minor collectors and provide access from all other streets except lanes, circles, ways, etc. and minor access ways with right-of-ways less than 40 feet. Collector roads form barriers between neighborhoods and are designed for higher speed than residential streets.

B. Design Volume: 500 to 3,000 vehicles per day

C. Right-of-Way: 100 feet for three lane collectors and
80 feet for two lane collectors

D. Constructed Street Width:

- a. Three lanes = 16 feet each lane with 12 foot center lane left turn, back of curb to back of curb
- b. Two lanes = 14 feet each lane with 12 foot left turn lane at intersections with arterials and major collectors, back of curb to back of curb

E. Number of Moving Lanes: 2, with center lane left turn

F. Design Speed: 35 to 40 miles per hour

G. Access Control: Access points every 200 feet

- a. Residential Uses: Direct Access
 - b. Commercial Uses: Direct Access
 - c. Industrial Uses: Access points every 200 feet
 - H. Parking Aisle: Permitted for 2 lane collector, 10 feet wide, one or both sides. No closer than 50 feet to any intersection.
 - I. Intersection Design: For arterials and collectors see Section 8-8-2-j
 - J. Horizontal Curves: 3 lanes = 250 feet, 2 lanes = 200 feet
 - K. Length of Tangent Between Reverse Curves: 100 feet
 - L. Nonvehicular Access Easement: See Section 8-8-7
 - M. Vertical Curves: Same as for arterials and collectors
 - N. Street Grades: Maximum = 7%; Minimum = 0.5%
 - O. Truck Restrictions: Trucks allowed only if trip destination is on a connecting residential or commercial street; otherwise no through truck traffic over five (5) tons allowed.
 - P. Bicycle Lanes: Only on minor collectors where there is no parking aisle; to be provided on one side of street only and for emergency parking use also. Lane shall be in addition to street width requirement and shall be seven (7) feet wide.
 - Q. Sidewalks: Where required, sidewalks shall be separate from street with minimum four foot width and three foot common strip (plant strip) between sidewalk and curb for residential districts and sidewalks of five feet width and four feet common plant strip between sidewalk and curb for commercial/industrial districts.
 - R. Trees and Landscaping: See Article 1, Section 800
3. Type: MAJOR LOCAL STREET (Example: Crawford St., Calle Sonora, Fairway Drive)
- A. Function: To provide direct access to abutting properties and connect to collector streets.
 - B. Design Volume: Up to 3,000 vehicles per day
 - C. Right-of-Way: 60 feet

- D. Constructed Street Width: '14 feet each lane, back of curb to back of curb. No center lane left turn.
- E. Number of Moving Lanes: 2
- F. Design Speed: 35 miles per hour
- G. Access Control:
 - a. Residential Uses: Direct access permitted
 - b. Commercial Uses: Direct access permitted
 - c. Industrial Uses: Where permitted, direct access
- H. Parking: One parking aisle, one side of street only, 10 feet wide in addition to required street width, allowed but not required
- I. Intersection Design: See Section 8-8-2-j
- J. Horizontal Curves: 200 foot radius residential/commercial districts; 250 feet industrial districts
- K. Length of Tangent Between Reverse Curves: 100 feet
- L. Nonvehicular Access Easements: See Section 8-8-7
- M. Vertical Curves: Same as for arterials and collectors
- N. Street Grades: Maximum = 10%; Minimum = 0.5%
- O. Truck Restrictions: No trucks over five (5) tons in residential areas except delivery, moving and construction type trucks and service vehicles.
- P. Bicycle Lane: Permitted on opposite side of street with parking aisle; and on major local streets designed with no parking aisle, for which bicycle-emergency stop lane shall be no less than seven (7) feet wide in addition to street width requirements.
- Q. Sidewalks: Residential = four (4) feet; commercial/industrial = five (5) feet, where required; there shall be a minimum of three (3) feet between sidewalk and curb in residential districts and four (4) feet between sidewalk and curb in commercial/industrial districts.
- R. Trees and Landscaping: See Article 1, Section 800

6. Type: MINOR LOCAL STREET

- A. Function: To provide direct access to abutting properties and collector streets.
- B. Design Volume: Less than 1,000 vehicles per day
- C. Right-of-Way: 48 feet
- D. Constructed Street Width: 12 feet each lane, back of curb to back of curb; no center left turn lanes.
- E. Number of Moving Lanes: 2
- F. Design Speed: 25 miles per hour
- G. Access Control:
 - a. Residential Uses: No restrictions
 - b. Commercial Uses: No restrictions
 - c. Industrial Uses: Where permitted, no restrictions
- H. Parking Aisle: Permitted but not required, however, parking aisles shall each be eight (8) feet wide in addition to street width requirements; There shall be no parking aisles in industrial districts due to heavy truck traffic and narrow width of street.
- I. Intersection Design: See Section 8-8-2-j
- J. Horizontal Curves: No less than 100 feet residential and commercial; no less than 250 feet industrial districts.
- K. Length of Tangent Between Reverse Curves: 100 feet
- L. Nonvehicular Access Easements: See Section 8-8-7
- M. Vertical Curves: Same as arterial and collector streets
- O. Street Grades: Maximum = 10% with 12% for no more than 600 feet; Minimum = 0.50%
- P. Truck Restrictions: Except for Industrial districts, no trucks over five (5) tons except for moving vans, delivery, service, and construction for construction purposes. No off-on-loading of trucks in street in industrial districts.
- Q. Bicycle Lanes: None
- R. Trees and Landscaping: See Article 1, Section 800

7. Type: *MINOR RESIDENTIAL* CUL-DE-SAC; LANE; COURT, ETC.

- A. Function: May be used at the end of or off of major and minor local streets, privately owned residential streets. Cul-de-sacs shall serve no more than 12 single family dwelling units, 24 duplex units, 72 multi-family units or condo-townhouse units and shall be no longer than 900 feet long except as determined appropriate for properties by the Planning and Zoning Commission, with approval of the Board of Aldermen for new subdivisions, or approval of a Use Permit by the Board of Adjustment. Units permitted shall be determined as appropriate up to the limits based on the amount of land available for development as determined by the Commission and approved by the Board of Aldermen.
- B. Design Volume: For Lanes and Courts = less than 300 per day
For cul-de-sacs: dependent upon number of units of development as determined by City Engineer..
- C. Right-of-Way:
- a. Residential: Lanes and Courts = 40 feet
Cul-de-sacs = Radius dependent upon number of units to be developed and shall be determined by City Engineer, but no less than 48 feet face to face at curb.
 - b. Commercial/Industrial: Radius dependent upon size of development and shall be determined by City Engineer, but no less than 54 feet face to face at curb.
- D. Constructed Street Width: As above in C for residential; 100 foot minimum radius face to face at curb for commercial and industrial districts.
- E. Number of Moving Lanes: 2
- F. Design Speed: 25 miles per hour
- G. Access Control:
- a. Residential Uses: No restrictions
 - b. Commercial Uses: No restrictions
 - c. Industrial Uses: Where permitted, no restrictions
- H. Parking Aisles: Permitted in all districts other than industrial; aisle shall be eight (8) feet wide in addition to street width; parking aisle not required.
- I. Intersection Design: See Section 8-8-2-j

- J. Horizontal Curves: Same as for minor local streets
- K. Length of Tangent Between Reverse Curves: 100 feet
- L. Nonvehicular Access Easements: See Section 8-8-7
- M. Vertical Curves: Same as for minor local streets
- N. Street Grades: Maximum = 12% for 600 feet or less, 10% otherwise; Minimum = 0.50%.
- O. Truck Restrictions: Commercial/Industrial districts:
No off-on-loading in street.
Residential: No trucks over five (5) tons except for moving vans, delivery, service vehicles, and construction vehicles for construction purposes.
- R. Bicycle Lanes: None
- S. Sidewalks: Where required: Commercial/Industrial = five (5) foot with four (4) foot plant strip between sidewalk and curb; Residential = four (4) foot with three (3) foot plant strip between sidewalk and curb.

8. Type: ALLEY

- A. Function: Provide secondary access to residential, commercial and industrial properties, or primary access where permitted.
- B. Design Volume: None
- C. Right-of-Way: Minimum 20 foot
- D. Constructed Alley Width: Minimum 20 foot
- E. Number of Moving Lanes: 2
- F. Design Speed: 10 miles per hour
- G. Access Control: None except where noted in district regulations, Article 1.
- H. Parking: Not permitted except for special provisions as approved by the Commission or Board of Adjustment upon written recommendation by City Engineer depending on location, purpose, condition, land availability and other factors.
- I. Intersection Design: None
- J. Horizontal Curves: 40 foot minimum radius

- K. Length of Tangent Between Reverse Curves: N/A
- L. Nonvehicular Access Easements: None
- M. Vertical Curves: Same as for arterials and collectors
- N. Alley Grades: Maximum 10%; Minimum 0.50%
- O. Truck Restrictions: None.
- P. Bicycle Lanes and Sidewalks: N/A

9. PUBLIC RESIDENTIAL STREETS

Residential streets primarily function to provide access to residential uses. All residential streets are primarily intended to accommodate relatively low traffic volumes at slow speeds in order to minimize the basic incompatibility of vehicles and people, in particular children, who characterize residential districts. Residential streets have historically been considered homogenous. Depending upon the type and density of development served by these streets most are categorized as follows: Major local, minor local, Lane, Court, Way, Cul-de-sac, Place, etc.

The following rules and procedures shall be used to determine the number of dwelling units served by a street under normal conditions and as a guide. This number shall then be used to determine the street type classification.

- A. A street segment is the length of a street between intersections or between points which define a change in street configuration (e.g., the length of a street which is one-way is a segment separate from the part of that same street which is two-way).
- B. The number of dwelling units served by a street segment includes all units having frontage on that street segment and all units which have frontage on other segments of that street or other streets which contribute to the traffic volume of that segment.
- C. When more than one route of access is available to a dwelling unit, that unit shall be counted as served by the street segments most likely to provide the access point for that unit. In order to determine this, either of the following methods may be used: (1) a direction-preference analysis shall be conducted to determine directional preferences for trips, or (2) the development shall be divided into trip areas based on the shortest exit route, taking into account any directional preference.

10. ADDRESSING-RENUMBERING OF STREETS

Addressing and re-numbering of new and old streets shall be according to the Addressing-Renumbering Ordinance of the City. (Article 11, this Ordinance), as well as naming of streets.

STREET PATTERN SUMMARY

STREET TYPE	NUMBER OF LANES	RIGHT- OF-WAY	STREET WIDTH	PARKING AISLES	LEFT TURN
MAJOR ARTERIAL	4	120'	16' EA. LANE	NO	12' EA. LN. (INTERSECTION)
MINOR ARTERIAL	4	120'	16' EA. LANE	NO	12' EA. LN. (INTERSECTION)
MAJOR COLLECTOR	4	120'	16' EA. LANE	NO	12' EA. LN. (INTERSECTION)
MAJOR COLLECTOR	3	100'	16' EA. LANE	NO	12' CENTER LEFT-TURN LANE
MINOR COLLECTOR	3	100'	16' EA. LANE	NO	12' CENTER LEFT-TURN LANE
MINOR COLLECTOR	2	80'	14' EA. LANE	10'	12' EA. LN. (INTERSECTION)
MAJOR LOCAL	2	60'	12' EA. LANE	10'	N/A
MINOR LOCAL	2	48'	12' EA. LANE	10'	N/A
MINOR RESIDENTIAL (LANE, COURT, WAY, PLACE, PRIVATELY OWNED	2	40'	12' EA. LANE	10'	N/A

NOTE: WHERE PARKING AISLES ARE DESIGNED, SAID AISLES SHALL NOT BE CLOSER THAN 50 FEET TO AN INTERSECTION FOR ARTERIALS AND COLLECTOR STREETS. THE REMAINING FOOTAGE SHALL BE USED IN THE DESIGN OF THE LEFT-TURN LANES, WHERE REQUIRED.

CENTER DIVIDER ISLANDS ARE PERMITTED BUT SHALL BE DESIGNED ACCORDING TO MINIMUM STANDARDS FOR CONSTRUCTION AND SHALL BE NO LESS THAN FIVE (5) FEET WIDE WITH APPROPRIATE CUTS FOR LEFT-TURN TRAFFIC ONTO OTHER STREETS AND MAJOR COMMERCIAL/INDUSTRIAL BUSINESSES. SAID ISLANDS SHALL BE LANDSCAPED WITH TREES, SHRUBS AND OTHER APPROPRIATE PLANTS.

INTERSECTIONS OF ARTERIALS AND COLLECTORS AND OTHER STREETS WITH SIDEWALKS AS REQUIRED SHALL HAVE HANDICAP CORNERS CONSTRUCTED ACCORDING TO STANDARDS.

WHERE DETERMINED BY THE ARIZONA DEPARTMENT OF TRANSPORTATION AS REQUIRED, INTERSECTIONS SHALL HAVE PROPER TRAFFIC CONTROL DEVICES AND LIGHTS, AND PAVEMENT MARKINGS.

ONE-WAY STREETS

STREET TYPE	# OF LANES	RIGHT- OF-WAY	STREET WIDTH	PARKING LANE	LEFT-TURN LANE
MAJOR ARTERIAL	N/A				
MINOR ARTERIAL	2	80'	16' EACH LANE (without parking aisles, right of way = 60 feet)	10'	10' EA. LN.
MINOR ARTERIAL	1	N/A			
MAJOR COLLECTOR	2	80'	16' EACH LANE (without parking aisles, right of way = 60 feet)	10'	N/A
MAJOR COLLECTOR	1	N/A			
MINOR COLLECTOR	2	60'	14' EACH LANE (without parking aisles, right of way = 48 feet)	10'	N/A
MINOR COLLECTOR	1	N/A			
MAJOR LOCAL	2	60'	14' EACH LANE (without parking aisles, right of way = 48 feet)	10'	N/A
MAJOR LOCAL	1	50'	16 FOOT LANE (without parking aisles, right of way = 34 feet)	10'	N/A
MINOR LOCAL	2	50'	12' EACH LANE (without parking aisles, right of way = 44 feet)	10'	N/A
MINOR RESIDENTIAL:	N/A				

Sec. 8-8-3.1 Streets Within a Planned Area Development

(See also Article 6, Planned Area Development, this Ordinance)

For streets located within a Planned Area Development, the following standards and requirements shall apply:

1. All streets to be dedicated to the city shall conform to the requirements for streets and off-site improvements contained in this Ordinance before the city shall accept the street(s) into the city maintenance system. Any such streets lacking the requirements shall be upgraded at developer's expense to city standards before said streets are accepted.
2. All arterial and collector type streets shall be public streets.
3. All major and minor local public streets shall be designed to prohibit their use by through traffic. Both ends of a loop street must intersect the same collecting street.
4. Privately owned streets (not dedicated to the public) may be paved with asphaltic concrete, portland cement, stones or brick, or other hard surface as approved by the City Engineer.
5. Privately owned streets shall be permitted only where a satisfactory means of providing for their control and maintenance is demonstrated. Generally, such control and maintenance should be accomplished through undivided ownership of the private street by a Property Owner's Association to which all unit owners must belong, under the covenants, conditions, and restrictions, Property Owner's Association articles, and by-laws.
6. All utilities on privately owned streets shall be constructed and maintained by the private owner(s).
7. The City of Nogales shall not be responsible for maintenance, liability or enforcement of traffic control, traffic control devices, pavement markings, street signs, lighting, curbs, gutters, sidewalks, ramps or any other related street item on privately owned streets, nor for liability resulting from improper engineering, construction, drainage, culverts, bridges, railings, damage of any sort, damage to private property or vehicles or persons resulting from any incident whatever, nor for the construction or destruction of any of the above thereof.
8. A sign shall be placed at the entrance of each privately owned street giving notice that the street is a private street.
9. Privately owned streets shall conform to the addressing-numbering grid of the city for addressing purposes and for the numbering of each building according to Ordinance 18-0.

10. If the owners of privately owned streets should request at sometime in the future that the streets be dedicated to the public, the owner(s) shall bear full expense of construction, re-construction or otherwise full conformance with the requirements of this Ordinance for city streets and off-site improvements, or any other action necessary as determined by Mayor and Board of Aldermen as recommended by city staff or the Planning and Zoning Commission, prior to dedication and acceptance. In addition, the owner(s) shall agree in writing that said streets to be dedicated shall be dedicated to the public use without compensation to the owner(s) for the street, nor for any required improvement, nor any expense borne by the owner(s) in preparation for dedication, nor for any necessary right-of-ways, or easements as required, nor for any damages, or liens on said street(s) or property, nor for any property taken as a requirement for right-of-ways or easements.

11. Where necessary, an easement or right-of-way shall be mandatory on or through any privately owned street for such public purposes in the interest of the health, welfare and safety of any person or building located on said private streets, or for the public health, safety, and welfare of the public in general.

Public purposes include, but are not limited to, access by emergency vehicles, police-fire-ambulance, emergency access into or through said streets or properties, sanitation collection, public emergencies, and other purposes as determined by Federal, State or local statutes and actions approved by the Board of Aldermen of the city.

Section 8-8-4 Water Facilities

- A. General Provisions: The developer shall install water lines and fire hydrants in a manner prescribed by this Code. The facilities shall be connected to an approved water system and shall be installed to provide adequate water pressure to serve present and future consumer demand. Connection to an approved water system main shall be permitted if the City Engineer and Fire Chief determine that:
1. If in Residential Areas there exists:
 - a. a minimum residual fire flow of: 750 gallons per minute, and
 - b. a minimum residual pressure of: 45 P.S.I.
 2. If in Commercial/Industrial/School District areas there exists:
 - a. a minimum residual fire flow of: 1,200 gallons per minute, and
 - b. a minimum residual pressure of: 60 P.S.I.
- B. Sizing System: Water facilities shall be designed for the ultimate development of the service area which shall be determined by consideration of the future land use identified by the General Plan.
- C. Standard Engineering Specifications:
1. Fire Hydrant Design and Construction:
 - a. Fire hydrants shall be installed as required and water service shall be provided to each lot. The developer shall be responsible for coordinating fire hydrants and water service design and installation with the City and/or the certified water company by the Arizona Corporation Commission and ADWR to service the subdivision.
 - b. For purposes of this Section, a fire hydrant is defined as a mechanical device specifically manufactured for the purpose of supplying water from a watermain to fire fighting equipment. Within the corporate limits of the city, fire protection facilities, including fire hydrants and watermains, shall conform to the following minimum specifications and installation criteria, if not otherwise specified in the city's minimum standards for public works construction, Ordinance 18-P:

DEVELOPMENT STANDARDS CODE

1. Fire hydrants shall be spaced at distances no greater than
- -
in residential zoning districts and at distances no greater than five hundred (500) feet in all other zoning districts. In cases where it is not feasible to construct hydrants to meet the spacing requirements stated above (as determined by the Director of Public Safety or his authorized representative) at least one hydrant shall be installed no greater than five hundred (500) feet from the furthest point of any proposed new building in a commercial district, and no greater than seven hundred fifty (750) feet from the furthest point of any proposed building in a residential district. All distances shall be measured along Streets, Public Ways, or Access Roadways.
2. Fire hydrants shall have two (2) two and one-half inch (2½") outlets and one (1) four and one-half inch (4½") outlet. The four and one-half inch (4½") outlet shall be installed so that the outlet faces the street and the bottom of the outlet shall be no less than one (1) foot above the surface of existing or proposed streets or sidewalks. Threads on all outlets shall be National Standard Hose Threads.
3. In all zoning districts, watermains supplying water to fire hydrants shall be no less than six inches (6") in diameter. Watermains shall be looped and valving installed such that a single break in the water distribution system will necessitate shutting from service a length of pipe no greater than six hundred (600) feet in residential zoning districts, and no greater than five hundred (500) feet in all other districts. In cases where it is not feasible to loop the water system (as determined by the Director of Public Safety or his authorized representative) watermains supplying water to fire hydrants shall be no less than eight inches (8") in diameter.

DEVELOPMENT STANDARDS CODE

- c. If the "minimum" flows cited in the preceding paragraph are not sufficient to provide required fire flow, or if the existing water system is incapable of supplying required fire flow, then there shall be provided such additional water supply as may be necessary to provide the flow required for fire protection. Water supply may consist of wells, reservoirs, pressure tanks, elevated tanks, watermains, or other fixed system capable of supplying the required fire flow. In determining the required fire flow for fire protection, the standards published by the Insurance Service Office in their publication entitled "Guide for Determination of Required Fire Flow", shall be used as a guide. See Appendix I.
- d. Personnel in the Department of Public Safety, Fire Division, shall color code hydrants in accordance with the flow capacities of the particular hydrant.

2. Water Line Design and Construction. See ARTICLE NINE

Section 8-8-5. Sewerage Facilities

- A. General Provisions. The applicant shall install sanitary sewage facilities in a manner prescribed by the City of Nogales. Connection to sewage lines shall be permitted if the City Engineer determines that the following facilities have adequate additional capacity to serve the development:
 - 1. The interceptor, trunk and feeder lines to the wastewater treatment plant; and
 - 2. The wastewater treatment plant.
- B. Sizing of the System. Sanitary sewer systems shall be designed for the ultimate tributary population, which shall be determined by consideration of the land uses identified by the General Plan. Sewer capacities should be adequate to handle maximum daily quantities of sewage and industrial waste together with an adequate allowance for infiltration and other extraneous flow.
- C. Standard Engineering Specifications. A public or community sanitary sewage system shall be installed and shall be constructed to plans, profiles, and specifications in accordance with State Health Department regulations Bulletin 11 and the City Code. See Article 9.

D. Termination of the Use of a Subsurface Disposal System

1. When a public sewage system becomes available, the development shall be connected to said sewer within ninety (90) days if the development is within 250 feet of the service, and adequate capacity is available at the connection.

The private sewage disposal system, septic tanks and/or cesspools contained within the private disposal system shall be pumped clear of all sludge, crushed and filled with clean back-run gravel or sand, by each property owner and said owner shall terminate the connection to the tank and install sewage disposal line(s) to the sewer main in the street. Each connection to the sewer main shall require a licensed plumber to make the connection according to State law.

Section 8-8-6 Surface Drainage and Storm Sewer System

- A. General Provisions: The Chief Building Inspector shall issue a building permit only where adequate provisions for storm or flood water run-off have been made. The storm water drainage system shall be separate and independent of any sanitary sewage system and according to Federal Emergency Management Agency specifications in floodplains. Inlets and culverts shall be provided as determined by the Floodplain Administrator and City Engineer so surface water shall be adequately drained so as not to drain onto any other private property and routed so as not to undermine public improvements including streets and intersections. Surface water drainage patterns shall be shown for each and every lot and block.
- B. Accommodation of Upstream Drainage: The culvert or other drainage facility shall be large enough to accommodate the potential run-off from development as calculated from the required drainage study, whether inside or outside of the development. The Floodplain Administrator and/or City Engineer as applicable shall determine the necessary size of the facility, based on the provisions of the construction standards, FEMA standards and specifications assuming conditions of maximum potential watershed development permitted by the various federal and state statutes.
- C. Effect on Downstream Drainage: Where it is determined that the additional run-off incident to the development will overload an existing drainage facility, the Floodplain Administrator and/or City Engineer shall inform the Chief Building Inspector, or Planning Director to withhold approval of site plans and building construction until the developer has made provisions for improvements of the drainage facilities in conformance with federal and state statutes.
- D. Drainage Management Practices: In the absence of a drainage report and master basin plan, a development may be required to employ drainage management practices which minimize the

amount and rate of surface water run-off into receiving streams, or other mitigating procedures. Drainage management practices may include, but are not limited to:

1. Detention basins
2. Retention basins
3. Minimization of impervious surfaces
4. Emphasizing natural water percolation and natural drainage-ways
5. Prevention of water flowing from the roadway in an uncontrolled fashion
6. Stabilization of natural drainageways as necessary below drainage and culvert discharge points for a distance sufficient to convey the discharge without channel erosion

Run-off from impervious surfaces shall be collected and transported to a natural or approved public drainageway with sufficient capacity to accept the discharge.

- E. Drainage Right-of-Way: All concentrated storm drainage that cannot be conveyed in a public street right-of-way shall be conveyed in a dedicated drainageway or in a drainage easement. Dedicated drainageways shall be owned by the public for public use and not included in any lot sale. Drainage easements are dedicated for public use to construct and maintain drainage facilities. They may be included in a lot, but the use of the lot shall be restricted to uses that will not interfere with the maintenance of the natural flow of storm drainage over and/or under the easement. A drainage easement shall be provided to accommodate run-off flow that will not drain into any other private property, and create a flood basin or holding site that will run off into other properties, nor shall undermine public and private roadways

Natural drainage shall not be blocked on any property unless provisions have been made on an approved hydrology and grading plan to accommodate any re-routing of flow according to federal and state statutes.

A dedicated drainageway shall be provided to accommodate the flow that is expected to occur at least once every twenty-five (25) years; provided however, that this requirement may be waived by the city when the resulting drainageway will be less than ten (10) feet in width and less than one foot (1') in depth unless statutes dictate otherwise. All drainage easements shall be at least fifteen (15') feet in width.

Section 8-8-7 Easement Planning

- A. Utility Easements: The developer shall provide utility easements as required by the serving utilities and shall be responsible for coordinating such with the utility companies concerned. Utility easements shall be a minimum of ten (10) feet for city utility easements, and shall be the minimum easement determined by other utility companies as approved by the Arizona Corporation Commission.

- B. Curvilinear Alignments: For lots facing on curvilinear streets, utility easements, or alleys, shall usually consist of a series of straight lines with points of deflection not less than one hundred twenty (120) feet apart, said points of deflection always occurring at the junction of side and rear lot lines on the side of the exterior angle. However, curvilinear easements or alleys may be employed providing that the minimum radii of centerlines are not less than (800) feet.
- C. Drainage: Dedicated drainage ways or drainage easements shall be provided for surface drainage courses abutting or crossing the tract in accordance with Section 8-8-6 above, and shall be a width sufficient to permit widening, deepening, relocating, or protecting such drainage courses as may be required according to federal or state statutes, or fifteen (15) feet, whichever is larger.
- D. Nonvehicular Access Easements: Lots arranged to back to an active railroad right-of-way or a commercial/industrial district, or to an arterial or collector street shall have a recorded nonvehicular access easement one (1') foot wide along the rear or side lot line.

Section 8-8-8 Electrical Service Design and Construction

- A. Street Lighting Standards: Street lighting design practices shall be in conformance to the adopted standards of the city. Lighting levels shall be in conformance with the following table. Street lighting is a required off-site improvement for any development of over four (4) lots by the developer.

TABLE 8-8-1

Type of Roadway/Land Use	Footcandle (AMHL) *	Uniformity Ratio
Arterial/Commercial	1.4	4:1
Arterial/Residential	1.0	6:1
Collector/Commercial	.9	4:1
Collector/Residential	.6	6:1
Local/Commercial	.6	6:1
Local/Residential	.4 to .2	None

* Average Maintained Horizontal Luminance.

B. Location Requirements. The following criteria shall be followed in the placement of street lighting fixtures:

1. Lights shall be placed at all intersections.
2. Midblock lights should be located at lot corners.
3. Separation between standards should be no less than three (3) nor more than six (6) lots apart.

C. Street Lights Required. Street lights on metal standards shall be installed on all streets within the development and on all streets developed in conjunction with the development. The City Engineer may approve, based on the request of the developer, the use of wooden standards when considered more advantageous in commercial and industrial areas. The developer shall be responsible for coordinating street lighting and electrical service design and installation with the Citizens' Utilities Corp., the Arizona Corporation Commission, and the Arizona State Engineer, as necessary.

Section 8-8-9 Water and Sever Line Standards

Caution shall be taken in design and construction to insure adequate protection of all water supplies from any waste water contamination. Water lines and sewer line systems shall be constructed in accordance with Arizona Department of Transportation Engineering Bulletins numbers 8, 10, 11, and 12.

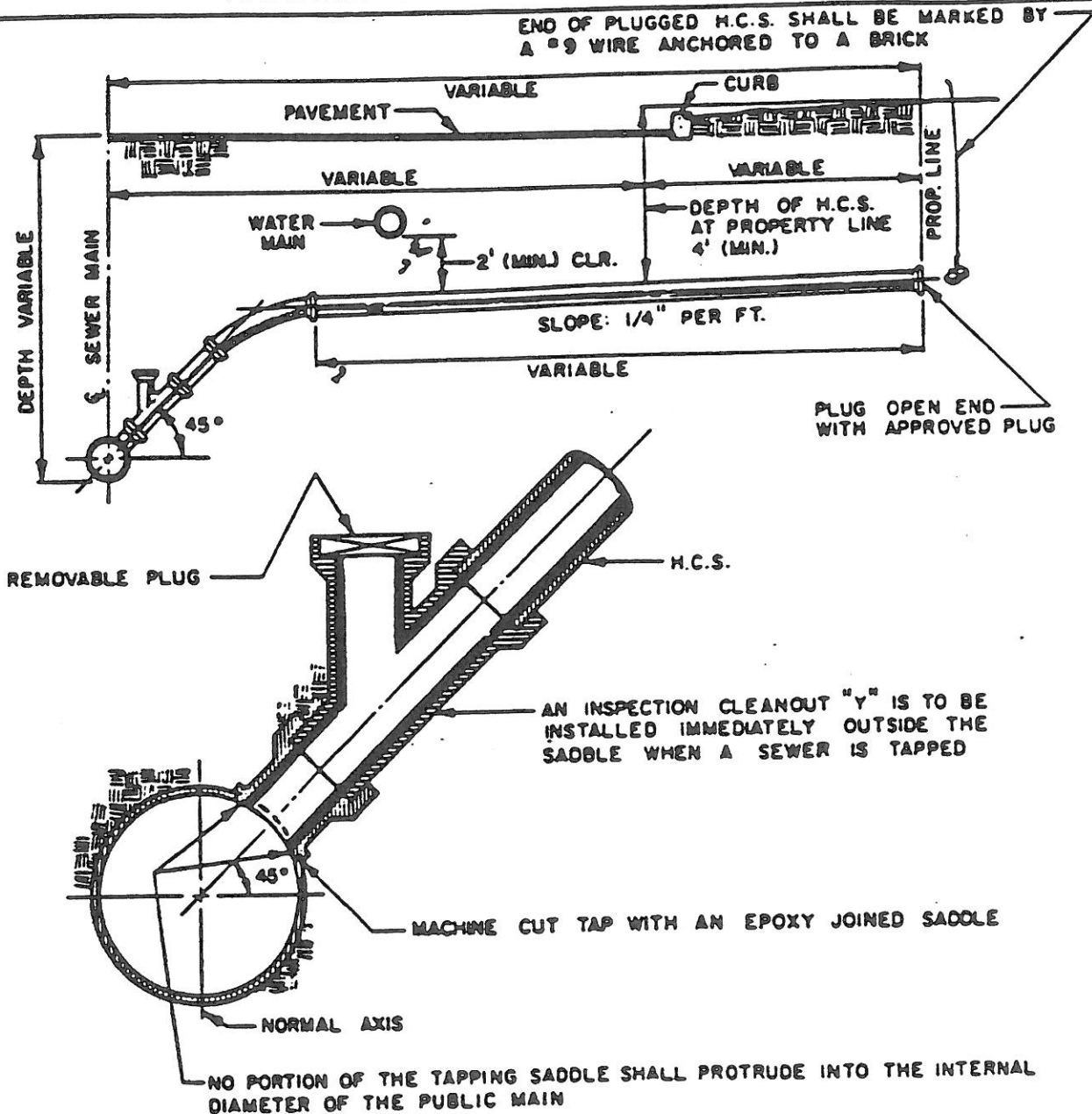
Cross-connections of water and sewer lines are forbidden. To minimize the potential of cross-contamination the Developer's engineer shall design the horizontal and vertical separation of water and sewer lines as follows:

1. Horizontal: When water lines and sewers are laid parallel to each other, the horizontal distance between them shall not be less than six (6) feet. Each line shall be laid on undisturbed or bedded material in a separate trench. Where conditions prevent the minimum horizontal separation set forth above, or where both lines have no choice but to be laid in the same trench, both the water line and sewer line shall be constructed of mechanical joint cast iron pipe, or other approved pipe, which is pressure tested to assure water tightness before backfilling. In such instances, a complete description of the circumstances and details of the proposed construction shall be attached to the plans submitted to the city.
2. Vertical: When a sewer crosses two (2) feet or more below a water line, no extra protection is required. When a sewer line crosses less than two (2) feet below a water line, the sewer shall be constructed of cast iron pipe with leaded or mechanical joints, or other approved pipe, for at least six (6) feet in both directions from the crossing, or the sewer shall be encased in concrete of six (6) inch minimum thickness for the same distance. When a water line must cross under a sewer, a vertical separation of at least 18 inches between the bottom of the sewer and the top of the water line shall be maintained with support provided for the sewer to prevent settling. The sewer shall be constructed of cast iron pipe with leaded or mechanical joints, or other approved pipe, at least six (6) feet in both directions from the crossing, or the sewer shall be encased in concrete of six (6) inch minimum thickness for the same distance.
Where the lines must touch, the above requirements shall be made and in addition a one inch pad of rubber or suitable equivalent shall be placed between the lines at the crossing for a distance equivalent to a six foot square to prevent cross-corrosion of pipes, pressure bounce and static electrical corrosion. Such an arrangement shall be pre-approved by the City Engineer before construction, otherwise the 18 inch separation shall be enforced.
3. No water pipe shall pass through or come into contact with any part of a sewer manhole.

4. Sanitary sewer line systems shall be designed for the following existing and anticipated future flow capacities:
 - A. Maximum rate of flow of domestic sewage for the entire service area for a specified time period.
 - B. Infiltration that is allowed for the entire service area.
 - C. Anticipated flow rates from commercial and industrial areas
 - D. Design periods should be chosen carefully and should be no less than fifty (50) years.
5. Depth of Pipes: Minimum cover over water pipes is essential to provide a distribution of stress from superimposed loads, and to provide protection from any potential frost action. External stress and required cover due to external loadings (static and dynamic superimposed forces and earthfill) can be determined in accordance with the applicable standards of the American Water Works Association for each kind of pipe, or by other acceptable criteria. In no case shall the depth of cover to the top of pipe be less than thirty (30) inches, unless adequate structural protection is provided and justified by the engineer. Where frost depths are greater than the above minimum, the cover should be equal to the frost depth, particularly for small lines which may not be flowing continuously.
6. Water Hammer: Water hammer is the phenomenon of oscillations the pressure of water about its normal pressure in a closed conduit, flowing full, that results from too rapid acceleration or retardation of flow. Water hammer may produce momentary pressures greatly in excess of normal static pressures, thus increasing the probability of water main failure. Suitable provisions shall be made to protect the system from water hammer pressures. The occurrence and severity of water hammer can be reduced through the use of slow-closing valves, pressure-release valves, surge tanks, and air chambers.

Pumps are particularly susceptible to surge damage during rapid shut-off. Pumps shall be protected from dynamic head by a spring loaded check valve or other safety valve.

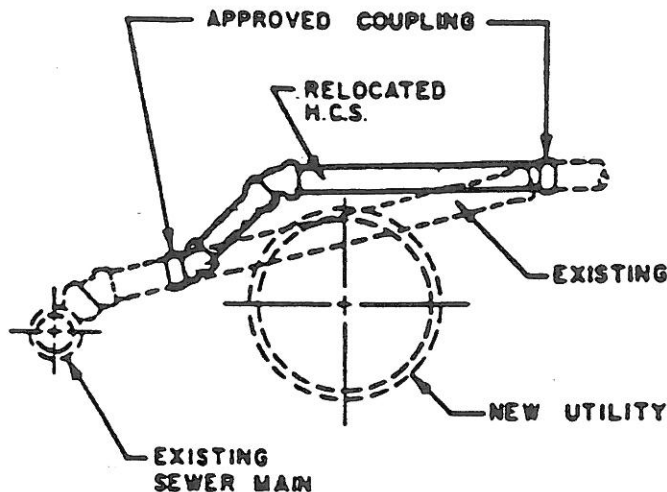
HOUSE CONNECTION SEWER



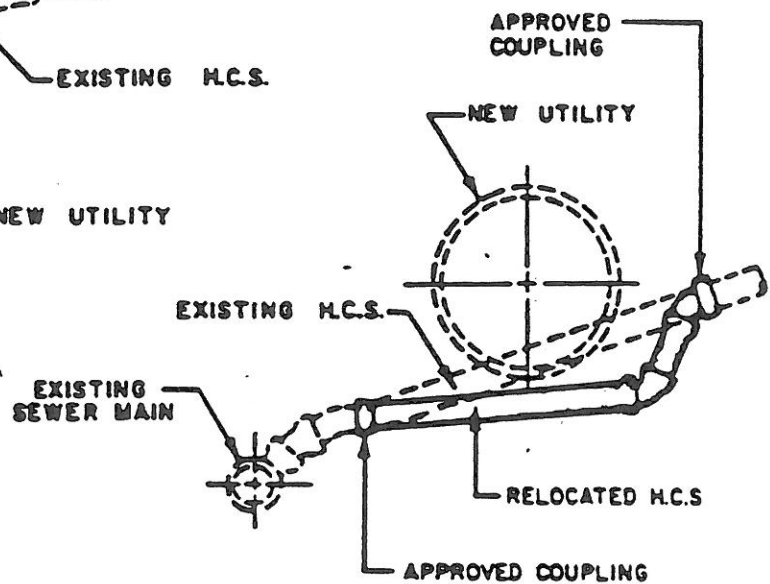
NOTES:

1. WHERE MINIMUM DEPTHS AND CLEARANCES CAN NOT BE MAINTAINED, A SPECIAL H.C.S. DESIGN WILL BE REQUIRED.
2. H.C.S. CONNECTIONS INTO SEWER MAINS 12" AND LARGER ARE NOT PERMITTED WITHOUT THE WRITTEN APPROVAL OF P.C.W.M.D.
3. H.C.S.'S GREATER THAN 4" IN DIAMETER MUST CONNECT INTO A MANHOLE IN ACCORDANCE WITH APPLICABLE STANDARD DETAILS.
4. THE OWNERSHIP AND MAINTENANCE OF THE ENTIRE H.C.S. SHALL BE THE RESPONSIBILITY OF THE CONNECTEE.
5. ALL CONNECTIONS TO PUBLIC SEWERS SHALL BE MADE WITH "Y" OR "T" FITTINGS OR BY A MACHINE CUT TAP.

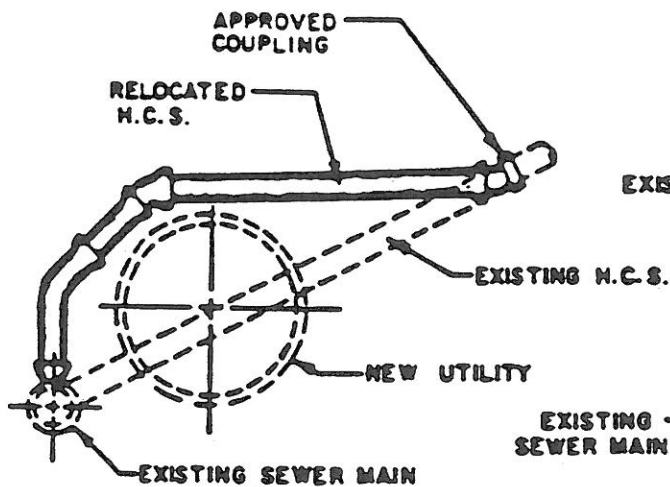
HOUSE CONNECTION SEWER REROUTING



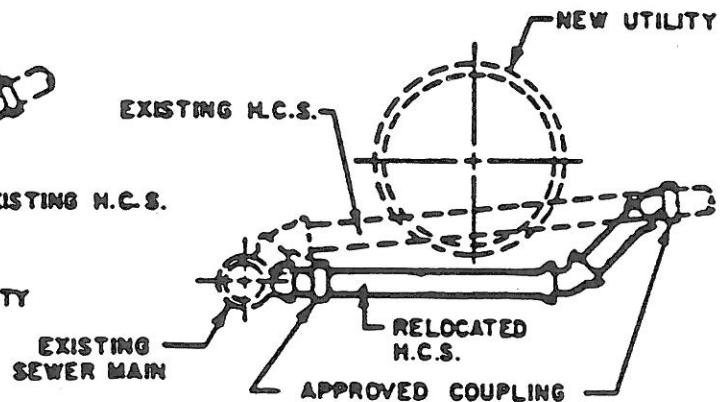
CASE "A"



CASE "C"



CASE "B"



CASE "D"

NOTES:

1. THE RELOCATED H.C.S. SHALL BE CONSTRUCTED OF DUCTILE IRON PIPE (D.I.P.) WHERE THE TOP OF THE H.C.S. IS LESS THAN 2 FT. BELOW THE UTILITY OR HAS LESS THAN 4 FT. OF COVER TO FIN. GRADE.
2. THE RELOCATED H.C.S. SHALL BE CONNECTED TO THE H.C.S. PIPE WITH APPROVED COUPLINGS.
3. USE OF CASE "D" TYPE REROUTING DEPENDS ON LEVEL OF FLOW (PRESENT AND FUTURE) WITHIN MAINLINE SEWER - SUBJECT TO CASE BY CASE APPROVAL BY ENGINEER
4. MINIMUM SLOPE ON ANY REROUTED SEGMENT OF H.C.S. TO BE 1.00%.

7. Dead Ends: Blow-off valves, fire hydrants, or other suitable means shall be installed at the ends of dead-end mains to allow periodic flushing of the lines. The minimum size of blow-off valves shall be 2" I.D. Primary feeder mains and larger distribution mains shall have a blow-off valve in each valved section which should be installed at low points in the mains where the flushing water can be readily discharged to natural drainage channels. Blow-off valves must be designed so that operation which will result in erosion or destruction of wildlife is not permitted. Special care must be taken to eliminate the possibility of contaminated water entering the distribution system through blow-off valves which have not been tightly closed.
8. Thrust Blocking: Thrusts on pipelines with unrestrained joints occur whenever a bend or branch outlet exists. Thrust forces can be large and may cause the movement and rupture of an inadequately anchored distribution main with unrestrained joints. If the lengths of pipe are joined by tension joints, such as welded joints in a steel pipeline and lugged joints in concrete and cast-iron pipelines, other forms of anchorage are not usually required. The determination of whether or not a given section of a line requires a thrust block shall be based on the size of the line and pressure ratings. All water lines eight (8) inches or larger shall require the construction of thrust blocks at all intersections with smaller or larger lines, and at all bend joints as a minimum and other nodes determined necessary by the City Engineer, including fire hydrant connections.
9. Fire Hydrants/Protection: Most single or combined water systems are designed to provide water for fire protection as well as supply water for potable needs. Information concerning the design of water systems to provide fire flows can be obtained from the Office of the State Fire Marshall, the City of Nogales Fire Chief, and the Uniform Fire Code.
 - A. Hydrant Installation: All fire hydrants shall be installed on firm footings such as stone slabs or concrete bases to prevent settling and strains on line joints. Separation of the pipe joints in the elbow beneath the hydrant is sometimes a problem because of forces created by the water pressure across the joint through the elbow. This problem can be alleviated by placing thrust blocks between the elbow and supporting undisturbed soil, or by tying the joint.
 - B. Hydrant Drains: Drains from hydrant barrels on distribution systems shall not be connected to sanitary sewers or storm drains. Where practicable, hydrant barrels should be drained to the ground surface, or to dry wells provided exclusively for that purpose.

10. Protection of Water Mains Near Sewer Lines

- A. General: Water lines located near sewers presents conditions for serious potential cross-connections. Protection from cross-contamination can be provided by separation of the facilities and special piping. The following factors should be considered in providing adequate protection:
 - a. Materials and type of joints for water and sewer pipes.
 - b. Service and branch connections into the water main and sewer line.
 - c. Compensating variations in the horizontal and vertical separations.
 - d. Space for repair and alterations of water and sewer pipes.
 - e. Off-setting of pipes around manholes.
- B. Horizontal and Vertical Separation: See Section 8-8-9, Nos. 1, 2, and 3.
- C. Surface Water Crossing: Surface water crossings present special problems which should be discussed in a preliminary meeting with the City Engineer and before plans are prepared.
 - a. Above Water Crossings: The pipe shall be adequately supported and anchored, protected from damage and freezing, and accessible for repair or replacement.
 - b. Undervater Crossings: Special considerations shall be given to the protection of the pipe from scour action, and in no event shall the minimum cover over the pipe be less than two (2) feet below the scour level. The pipe shall be of special construction having flexible watertight joints. Mechanical joints with rubber gaskets are satisfactory and acceptable. Valves shall be provided at both ends of water crossings so that the section can be isolated for test or repair. The valves shall be easily accessible and not subject to flooding. Sampling taps shall be available at each end of a crossing to facilitate the sanitary control on water crossings. Permanent taps shall be made for installing pressure gauges and applying compressed air for testing and locating leaks.

11. Line Markings

A. Reclaimed Water Line Tape Marking

Underground pipe marking tape shall consist of a minimum

4.0 mil thickness, inert polyethylene plastic which is impervious to all known alkalis, acids, chemical reagents and solvents likely to be encountered in the soil. The tape width shall be equal to the diameter of the pipe for mainlines and 3" for service lines. All locating and marking tape shall be solid red in color. The tape shall have printed thereon the following:

"CAUTION! NON-POTABLE WATERLINE: CONTACT CITY OF NOGALES WATER DEPARTMENT"

Tape shall be imprinted continuously over the entire length in permanent black lettering. The lettering shall be a minimum 1 1/2 inches high. In no instance shall the spacing of the individual segment of the identifying message be greater than eight inches (8"). The marking tape shall be installed on all reclaimed pipelines and service lines. It shall be laid directly on top of the pipe along the pipe centerline and shall be permanently affixed by wrapping the pipe circumference with adhesive tape at no greater than four-foot (4') intervals along the pipeline.

B. Reclaimed Water Detectable Pipe Locating Tape

After the trench is backfilled per applicable Standard and/or special specifications to within eighteen inches of the finished grade the contractor shall install a detectable pipe locating tape over all reclaimed water mains. (Service laterals will not require "Detectable" tape). The backfill shall be sufficiently leveled so that the tape will be installed on a flat surface. The tape shall be centered in the trench with the printed side up. Caution shall be exercised to avoid displacement of tape and to ensure its integrity. The tape shall consist of a minimum 4.0 mil thickness, inert polyethylene plastic which is impervious to all known alkalis, acids, chemical reagents and solvents likely to be encountered in the soil, with a minimum 1/3 mil metallic foil. The tape shall be at least three inches (3") in width and shall be red in color with identifying print in black letters, on one side only. The tape shall have printed thereon the following:

"CAUTION! NON-POTABLE WATERLINE: CONTACT CITY OF NOGALES WATER DEPARTMENT"

The identifying lettering shall be 1 1/2 inches high and repeated continuously the full length of the tape. In no instance shall the spacing of the individual segment of the identifying message be greater than eight inches (8"). The remainder of the trench shall then be backfilled and compacted per applicable standard or specification.

C. Potable Water Detectable Pipe Locating Tape

After the trench is backfilled per applicable standard or specification to within eighteen inches (18") of the finished grade the contractor shall install a detectable pipe locating tape over all water mains. The backfill shall be sufficiently leveled so that the tape will be installed on a flat surface. The tape shall be centered in the trench with the printed side up. Caution shall be exercised to avoid displacement of tape and to ensure its integrity.

The remainder of the trench is then backfilled in accordance with applicable standards or specifications.

The tape shall consist of a minimum of 4.0 mil thickness, of inert polyethylene plastic which is impervious to all known alkalis, acids, chemical reagents and solvents likely to be encountered in the soil, with a minimum 1/3 mil metallic foil. The tape shall be at least three inches (3") in width and shall be solid blue with identifying print in black letters, one side only. The tape shall have printed thereon the following:

"CAUTION! BURIED (POTABLE) WATERLINE BELOW"

The identifying lettering shall be 1 1/2 inches high and repeated continuously the full length of the tape. In no instance shall the spacing of the individual segment of the identifying message be greater than eight inches (8").

D. The developer/contractor shall submit with the preliminary plat an affidavit of compliance that the tape proposed to be furnished shall comply with the above specifications.

12. Water Service Copper Materials Standards

- A. This provision covers 3/4 inch to 2 inch fittings and pipe for working pressures of 300 pounds or less.
- B. Fittings and connections connecting directly to copper pipe shall be flared.
- C. Copper pipe shall be annealed and meet ATSM specification B-88 Type K. No copper pipe of foreign manufacture will be accepted, nor shall the copper used in the fabrication of the pipe be of foreign manufacture.
- D. Corporation stops, sizes 3/4 inch to 2 inch inclusive, ground key design, shall be of all bronze plug valve design, having two male ends, with the inlet threaded "Mueller" tapered threads and the outlet having "copper" thread, complete with straight coupling nut designed to be used with flared copper joint. Quality and workmanship must be comparable to the Mueller H-15000 design.
"Mueller" and "copper" threads are described in AWWA Specification No. C800-55.
- E. Splice unions shall be Mueller No. H-15400 or H-15402, three part design or equivalent, for use with type "K" copper service piping, sizes 3/4 inch to 2 inch inclusive. One three-piece splice union may be used for each sixty-foot roll of copper tubing, sizes 3/4 inch and 1 inch; or for each twenty-foot length of copper tubing, sizes 1 1/2 inch and 2 inch. They may also be used in extending existing copper services to a new required length.
- F. Straight adapter couplings copper to iron, are to be Mueller H-15425 or approved equal.
- G. Curb Stops:
 - a. Sizes 3/4 inch and 1 inch
Curb stops for 3/4 inch and 1 inch service shall be all bronze ground key angle stops with the inlet equipped with copper service pipe connection for flared joint with copper pipe. These angle stops shall be Mueller H-14255, or equal.
 - b. Sizes 1 1/2 inch and 2 inch
Curb stops for 1 1/2 inch and 2 inch services shall be ground key angle meter stops having oval type water meter flange outlet and copper service pipe inlet and connection. These angle stops shall be Mueller H-14276 or equal.
- H. Service clamps with bails and rubber or neoprene gaskets

shall be either single or double strap, with Mueller tapered thread, of corrosion-resistant materials, described as follows:

a. Saddles

Acceptable materials for use in clamp saddles are: (1) Ductile iron, meeting ASTM Spec. No. A-339, coated externally with not less than 8 mils of fused epoxy (holiday tested). Any other coating proposed to be furnished must be of similar durability and thickness and must be approved by the City Engineer prior to use; (2) Malleable iron, meeting ASTM Spec. No. 35018, coated as described under ductile iron.

B. Straps or Bails

Straps and nuts shall be fabricated from stainless steel (AISI 18-8 Type 304). Each strap shall be designed to include a flattened surface suitable for tightening against the circular pipe exterior with evenly distributed bearing area.

Single-strap clamps may be used provided that the gasket to be furnished shall provide a taper seal to surround the tap and compresses uniformly when the strap nuts are tightened, avoiding eccentric loading problems.

I. Approved methods for tapping water mains are shown in the following table:

J. Joint Use Trench Notes

- a. Telephone, electric and gas shall be installed and back-filled in strict accordance to the respective service company specifications.
- b. Sleeves will be required for telephone and electric cables beneath all thrust blocks and at mainline crossings with water.
- c. All thrust blocks shall extend to undisturbed soil.
- d. The bedding, to a minimum of 6 inches above the top of the gas and telephone mainlines, shall consist of "select" material compacted to a minimum density of 85% of maximum density per AASHTO Test Designation T-99, Method A. "Select" material is defined as imported granular material less than one inch in size with no more than 5% passing a #200 sieve and a plasticity index of 6 or less (PI 6).
- e. The backfill, from 6 inches above the gas and telephone mainlines, to the top of the trench shall consist of "suitable" material compacted to the minimum relative density in accordance with the requirements of the service agency that has jurisdiction over the right-of-way. "Suitable" material is defined as any imported or excavated trench material that is less than twelve inches (12") in size and does not include any foreign items such as broken concrete, asphalt pavement, broken pipe pieces, timber, cardboard or other debris. The ratio of large size (greater than 3 inches) to fines shall not exceed 30% large with 70% fines by volume. Rock clusters will not be permitted.

K. 4 to 10 Inch Meter Installation: Miscellaneous Notes

for pressure reducing valves, reclaimed water installation, and backflow prevention assemblies:

- a. If a pressure reducing valve is required, it shall be installed upstream of the meter assembly. The P.R.V shall be within the enclosure.
- b. On reclaimed water meter assemblies, standpipe with 2 inch ball valve and plug shall be installed on the downstream side of the meter assembly. The 2 inch standpipe is for introducing dye during a dye test. (See detail below)
- c. Backflow prevention assemblies shall be provided and said backflow prevention assemblies shall be installed per all applicable provisions of ADEQ and city standards.
- d. Reclaimed water meter assemblies do not require backflow prevention assemblies, but shall have provisions for a 2 inch by-pass to insure water supply to the customer

when the meter assembly is being repaired, replaced or tested.

L. Joint Use Trench for Utilities When Approved

A joint use trench arrangement will be allowed when circumstance, terrain, geology and other circumstances make it unfeasible or impossible to utilize a standard utility trenching format for water, sewer, telephone, electric, cable TV, and gas lines.

Each joint use trench will be considered on a case by case basis upon submission of the preliminary plat. Developer shall submit documentation and other data supporting his request to use a joint use trench for the utilities. If the right-of-way, terrain, geology and layout is conducive to separate trenching, then said separate trenching according to the utility trenching standards in this Code shall be adhered to.

ON THE APPROVED CONSTRUCTION DRAWINGS

APPROPRIATE PLASTIC WARNING TAPE

SUITABLE BACKFILL

SELECT BEDDING

DETECTABLE IDENTIFYING TAPE

FINISHED GRADE

12"

30"

10"

6"

6' MIN.

6" MIN.

36" MIN.

60" MIN.

12" & UNDER WATERMAIN

44" MIN.

6"

4" MIN.

LEGEND

- (T) = TELEPHONE CABLE
- (E) = ELECTRIC CABLE
- (G) = GAS MAIN
- (W) = WATER MAIN
- (S) = SEWER MAIN

